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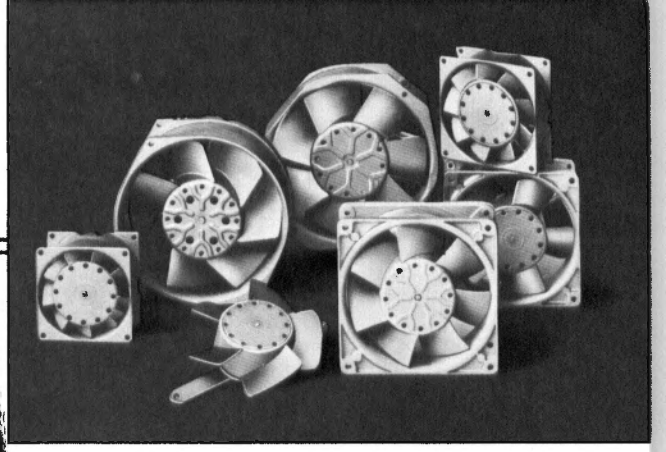
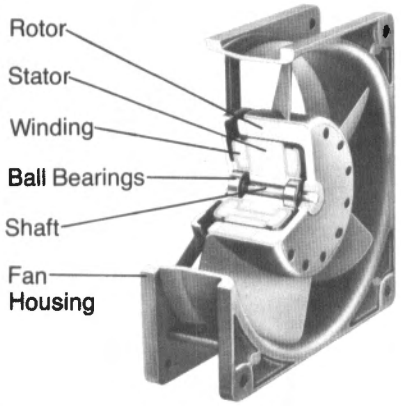
Tubeaxial Fans
INTRODUCTION



DEVERELL ASSOCIATES
WELLINGTON
REC. 23 MAY 1985
ANSD.....

One simple, reliable design for every electronic application

The building block for all ebm Tubeaxial Fans is the external rotor motor. With this design, the external rotor rotates around the internal stator. The impellers are attached directly to the external rotor which allows excellent heat dissipation and therefore low



life-cycle costs. The large air gap between the surfaces reduces magnetizing current, and results in a compact design with high air performance.

Motors

The motors used in ebm Tubeaxial fans are either shaded-pole, or PSC designs with Class "B" insulation. Available fans operate at 115V or 230V, 50/60Hz. Dual voltage 115/230V motors and other special models rated from 12V to 240V are also available. All motors are impedence protected in accordance with UL, CSA and VDE requirements. Electromagnetic interference (EMI) is greatly reduced by the self-shielding external rotor. This inherent feature of the ebm design makes it ideal for use in sensitive electronic equipment.

Construction

All-metal construction provides excellent heat dissipation, long life and structural stability. The fan itself functions as a heat sink by effectively transferring heat from the motor to the air stream via the metal impeller blades. The impeller blades are sheet steel, precision machined and welded to the metal rotor casing. The housing is die-cast aluminum.

The rotor and impeller blades are dynamically balanced in two planes in accordance with VDI2060. In addition, the fans are finished with an electrostatically applied black varnish to protect against severe environmental conditions.

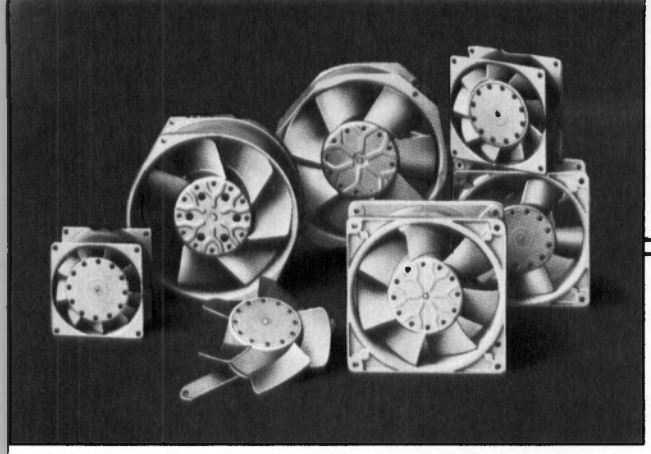
Bearing System

The type of bearing system selected will directly affect the "life" of the fan. It is recommended that sleeve bearings be used for −10°C to 60°C; ambients and ball-bearings for −30°C to 75°C. With either bearing system, typical operating life is between 20,000 and 40,000 hours. Actual life will depend on ambient temperature, duty cycle, mounting position and environmental conditions; 100,000 hours is not uncommon. Bearings are totally maintenance free.

Generally, sleeve bearing fans are recommended for use only in horizontal air flow applications. Ball bearings provide superior fan life in all orientations.

Safety

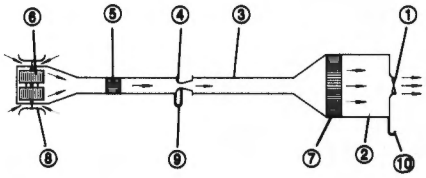
All fans are designed to meet UL, CSA and VDE standards. Approved products are listed in UL yellow card E54522; CSA file LR3145 and VDE 836 and 11585. It is the responsibility of the user to be sure fans are installed and operated in accordance with all safety codes. Care should be taken to insure that the connecting screws for ground leads do not extend into the housing opening and impede operation of the impeller blades.



Tubeaxial Fans
INTRODUCTION

Air Performance

The air performance of ebm fans is precisely determined in ebm's aerodynamic laboratory by using the test chamber shown in Fig. 2.



① **Fan Under Test**

② **Pressure Chamber**

③ **Measuring Channel**

④ **Venturi Tube**

⑤ **Flow Straighteners**

⑥ **Auxiliary Fan**

⑦ **Flow Straighteners**

⑧ **Choke**

⑨ **Differential Pressure Manometer**

⑩ **Static Pressure Manometer**

Fan performance curves are determined in accordance with DIN1952 and DIN24163.

Acoustics

Acoustical sound measurements are made in an anechoic chamber at nominal voltage with a microphone one meter from fan air inlet. Sound values are determined using a Bruel and Kjaer sound level meter 2203. Low noise levels are achieved by computer-assisted-design of impeller blades and by precision manufacturing and balancing.

Fan Selection

Selection of the appropriate fan should be based upon the following criteria:

Air Volume = CFM
Size and Weight
Acoustical Noise
Static Pressure

The air volume required for cooling electronic components can be determined from the following formula:

$$CFM = \frac{1760 \times KW}{T_c}$$

KW = heat to be dissipated
T_c = allowable temperature rise (estimated at 10°C)

Static pressure or the resistance of components to air flow is more difficult to calculate. Therefore, most designers resort to empirical determinations and testing fans in actual equipment.

Hall Effect Monitor

Selected ebm fans and blowers are available with a monitoring device consisting of a magnet and solid state switch built into the motor. The Hall effect monitor triggers an audible or visual alarm or provides an orderly system shut-down when the output signal created by the magnet changes due to a malfunction. This device is suited for computer, peripheral, copier or other business machine OEMs.

ebm . . . International Resources

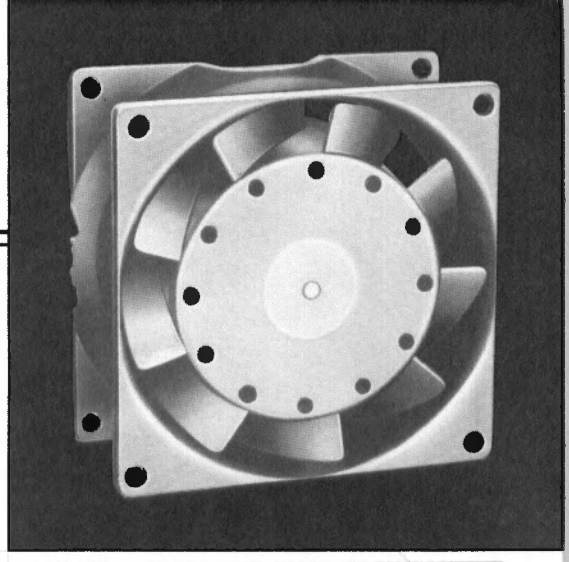
High quality ebm fans are manufactured by ebm Elektrobau Mulfingen Gmbh & Co., West Germany. ebm Elektrobau Mulfingen is a sister company to Ziehl-Abegg KG, founded in 1910. The products shown in this catalog are distributed worldwide to meet a variety of cooling applications in electronics equipment, copiers, business machines, instrumentation, air-conditioners, appliances and heating equipment. Your local ebm representative is ready to serve you.

AC Fan Selection Guide

Type	Size	CFM	db(SIL)
W2S 075	3⅛" x 1½"	32 25 18	23 18 16
W2S 086 **W2S 108** **W2S 107**	3⅝" x 1½" 4 7/16" x 2" 4 11/16" x 1½"	46 100 106 71 48	34 40 34 23 15
W2S 115 **W2S 130** **W2E 142**	5" x 1½" 6" x 2" 6" x 1½"	127 233 236	40 41 53

W2S 075

3⅛" x 1½" (80mm x 38mm)



DESCRIPTION

Motor
Shaded-pole external rotor motor with Class "B" insulation system. Maintenance-free sleeve or ball-bearings.

Construction/Finish
All-metal construction provides good heat dissipation, long life. Die-cast aluminum housing; sheet steel impeller blades are welded directly to the rotor hub. Surfaces are electrostatically varnished in black.

Mounting
Mount from either face using four .169" (4.3mm) holes with #8 screws and nuts. Ground connections are located on the housing.

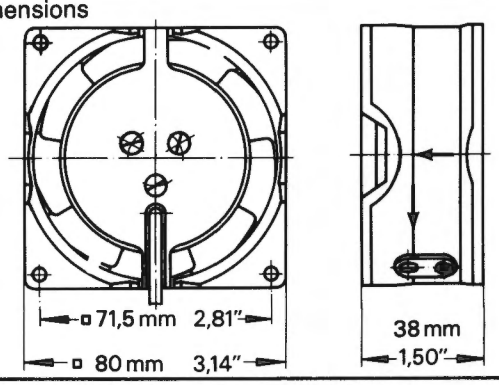
Connection
Two flying leads 12" (290mm) long.

Weight
1.1 lbs. (.5kg); .9 lbs. (.40kg) for skeleton fan without housing.

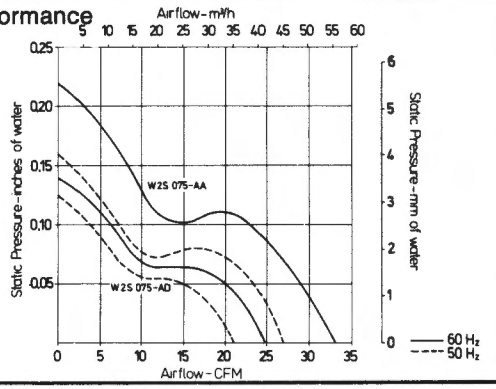
Safety Codes
All fans are designed to meet UL, CSA and VDE standards. Approved products are listed in:
UL Yellow Card E54522; CSA File LR43145 and VDE 836.

Life
Rated 20,000 to 40,000 hours under typical operating conditions. Actual life varies according to ambient temperature, duty cycle, mounting position and environment.

Dimensions



Air Performance



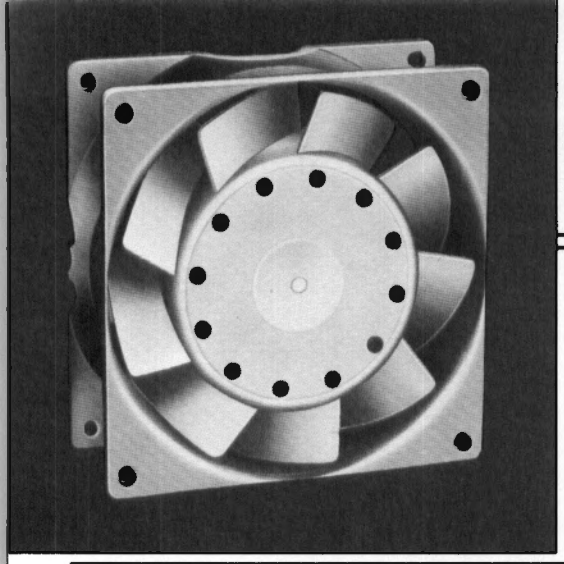
Accessories
Finger guard
9480-2-4039

Options
Dual voltage
115/230V motors
Hall effect monitor

Type	Bearing	Volts	H_z	Watts[1]	CFM[1]	db(A)[1]	db(SIL)[1]	Max. Temp. °C
W2S 075-AA11-02	Sleeve	115	50/60	9	32	38	23	60
W2S 075-AA11-01	Ball	115	50/60	9	32	38	23	75
W2S 075-AA11-68*	Sleeve	115	50/60	9	32	38	23	60
W2S 075-AA13-02	Sleeve	230	50/60	9	32	38	23	60
W2S 075-AA13-01	Ball	230	50/60	9	32	38	23	75
W2S 075-AA13-81	Sleeve	115/230	50/60	9	32	38	23	60
W2S 075-AD11-02	Sleeve	115	50/60	8	25	30	18	60
W2S 075-AD11-01	Ball	115	50/60	8	25	30	18	75
W2S 075-AD13-02	Sleeve	230	50/60	8	25	30	18	60
W2S 075-AD13-01	Ball	230	50/60	8	25	30	18	75
W2S 075-AD13-81	Sleeve	115/230	50/60	8	25	30	18	60
W2S 075-AE11-02	Sleeve	115	50/60	8	18	24	16	60
W2S 075-AE11-01	Ball	115	50/60	8	18	28	17	75
W2S 075-AE13-02	Sleeve	230	50/60	8	18	24	16	60
W2S 075-AE13-01	Ball	230	50/60	8	18	28	17	75
W2S 075-AE13-81	Sleeve	115/230	50/60	8	18	24	16	60
A2S 075-BA11-02**	Sleeve	115	50/60	9	32	38	23	60

*Hall effect monitor **Skeleton fan without housing

[1]@ 60H_z; 0 static pressure

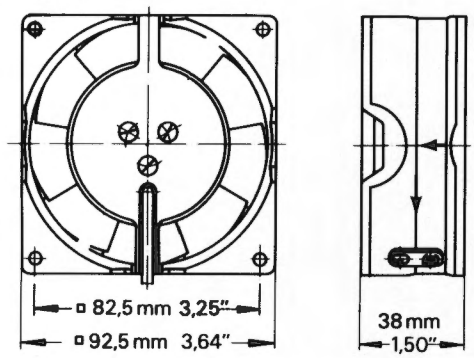


Tubeaxial Fans

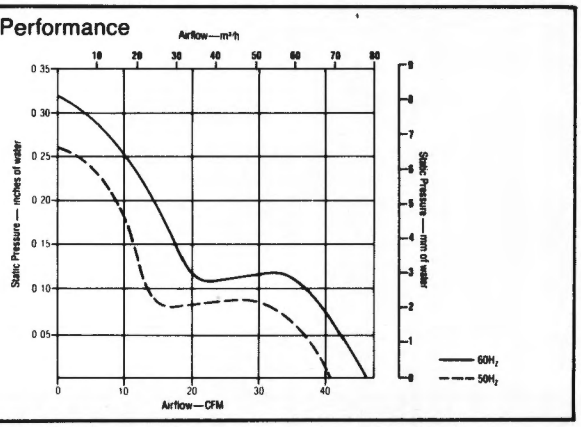
W2S 086

3⅝" x 1½" (92.5mm x 38mm)

Dimensions



Air Performance



DESCRIPTION

Motor
Shaded-pole external rotor motor with Class "B" insulation system. Maintenance-free sleeve or ball-bearings.

Construction/Finish
All-metal construction provides good heat dissipation, long life. Die-cast aluminum housing; sheet steel impeller blades are welded directly to the rotor hub. Surfaces are electrostatically varnished in black.

Mounting
Mount from either face using four .169" (4.3mm) holes with #8 screws and nuts. Ground connections are located on the housing.

Connection
Two flying leads 11" (280mm) long.

Weight
1.3 lbs. (.6kg)

Safety Codes
All fans are designed to meet UL, CSA and VDE standards. Approved products are listed in:
UL Yellow Card E54522; CSA File LR43145 and VDE 836.

Life
Rated 20,000 to 40,000 hours under typical operating conditions. Actual life varies according to ambient temperature, duty cycle, mounting position and environment.

Accessories
Finger guard
9483-2-4039

Specifications

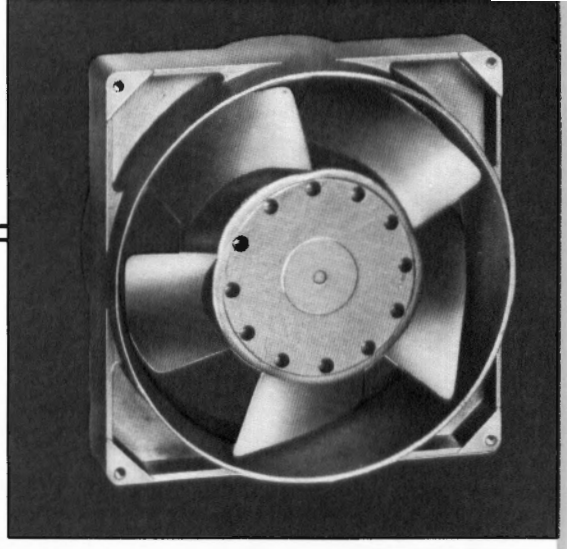
Type	Bearing	Volts	H_z	Watts[1]	CFM[1]	db(A)[1]	db(SIL)[1]	Max. Oper. Temp. °C
W2S 086-AA07-02	Sleeve	115	50/60	13	46	43	33	60
W2S 086-AA07-01	Ball	115	50/60	13	46	43	33	75
W2S 086-AA05-02	Sleeve	230	50/60	16	46	43	33	60
W2S 086-AA05-01	Ball	230	50/60	16	46	43	33	75
W2S 086-AC07-02	Sleeve	115	50/60	13	35	38	27	60
W2S 086-AC07-01	Ball	115	50/60	13	35	38	27	75
W2 S086-AC05-02	Sleeve	230	50/60	14	35	38	27	60
W2S 086-AC05-01	Ball	230	50/60	14	35	38	27	75
W2S 086-AB07-02	Sleeve	115	50/60	11	25	31	23	60
W2S 086-AB07-01	Ball	115	50/60	11	25	31	23	75
W2S 086-AB05-02	Sleeve	230	50/60	12	25	31	23	60
W2S 086-AB05-01	Ball	230	50/60	12	25	31	23	75

[1]@ 60H_z; 0 static pressure

Tubeaxial Fans

W2S 108

4.4" x 2" (112.7mm x 50mm)



DESCRIPTION

Motor
Shaded-pole external rotor motor with Class "B" insulation system. Maintenance-free sleeve or ball-bearings.

Construction/Finish
All-metal construction provides good heat dissipation, long life. Die-cast aluminum housing; sheet steel impeller blades are welded directly to the rotor hub. Surfaces are electrostatically varnished in black.

Mounting
Mount from either face using four .169" (4.3mm) holes with #8 screws and nuts. Ground connections are located on the housing.

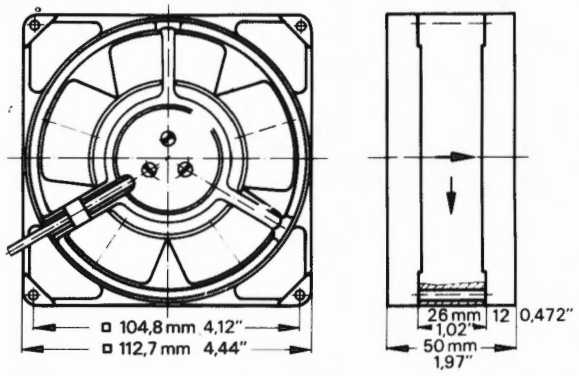
Connection
Two flying leads 11" (280mm) long.

Weight
2.0-lbs. (.9kg)

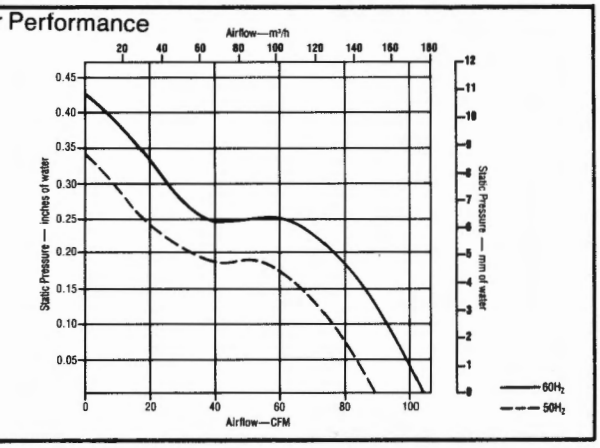
Safety Codes
All fans are designed to meet UL, CSA and VDE standards. Approved products are listed in:
UL Yellow Card E54522; CSA File LR43145 and VDE 836.

Life
Rated 20,000 to 40,000 hours under typical operating conditions. Actual life varies according to ambient temperature, duty cycle, mounting position and environment.

Dimensions

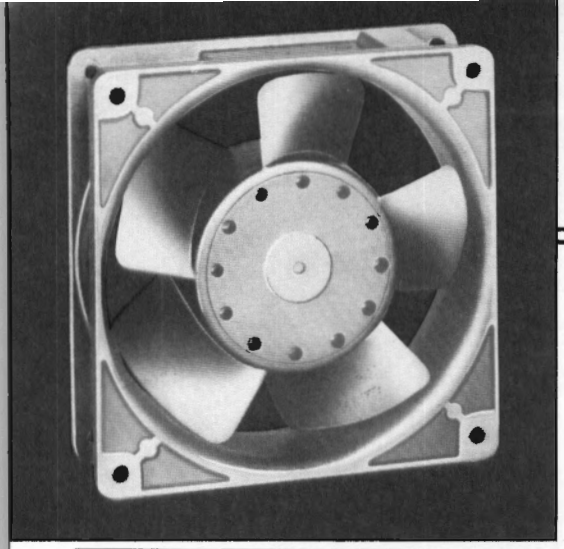


Air Performance



Specifications

Type	Bearing	Volts	Hz	Watts¹	CFM¹	dB(A)¹	dB(SIL)¹	Max Oper. Temp °C
W2S 108-AA03-02	Sleeve	115	50/60	22	100	54	40	60
W2S 108-AA03-01	Ball	115	50/60	22	100	54	40	75
W2S 108-AA01-02	Sleeve	230	50/60	22	100	54	40	60
W2S 108-AA01-01	Ball	230	50/60	22	100	54	40	75



Tubeaxial Fans

W2S 107

4 11/16" x 1½" (119mm x 38mm)

DESCRIPTION

Motor
Shaded-pole external rotor motor with Class "B" insulation system. Maintenance-free sleeve or ball-bearings.

Construction/Finish
All-metal construction provides good heat dissipation, long life. Die-cast aluminum housing; sheet steel impeller blades are welded directly to the rotor hub. Surfaces are electrostatically varnished in black.

Mounting
Mount from either face through four .177" (4.5mm) holes with #8 screws and nuts. Ground connections are located on the housing.

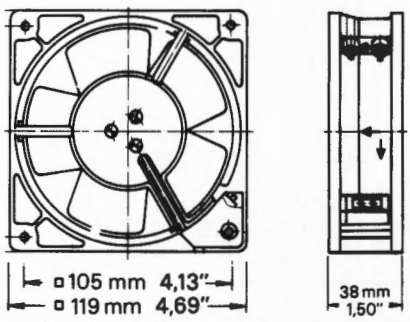
Connection
Two .110" (2.8mm) wide, .020" (.51mm) thick and .33" (8.5mm) long on .295" (7.5mm) centers. Flying leads available.

Weight
1.4 lbs. (.62kg); 1.0 lbs. (.45kg) for skeleton fans.

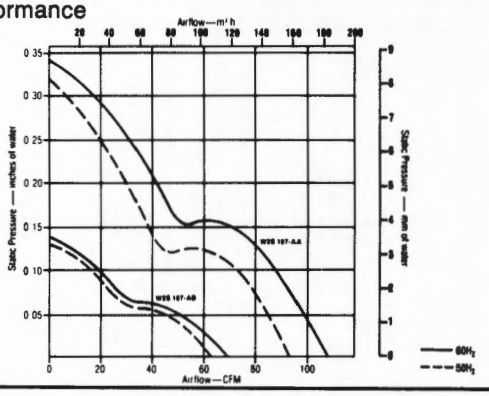
Safety Codes
All fans are designed to meet UL, CSA and VDE standards. Approved models are listed in:
UL Yellow Card E54522; CSA File LR43145 and VDE 11585.

Life
Rated 20,000 to 40,000 hours under typical operating conditions. Actual life varies according to ambient temperature, duty cycle, mounting position and environment.

Dimensions



Air Performance



Accessories

Finger guard
9497-2-4039

Plug and cord set
1434-4-6711

Shock/vibration mount
2678-2-2945

Grill guard
10016-1-5170

Grill guard, filter
10017-1-5170

Grill guard, filter and spacer
10018-1-5170

Options

Dual voltage
115/230V motors

Hall effect monitor

Type	Bearing	Volts	Hz	Watts[1]	CFM[1]	db(A)[1]	db(SIL)[1]	Max. Temp. °C
W2S 107-AA15-39	Sleeve	115	50/60	17	106	45	34	60
W2S 107-AA15-13	Ball	115	50/60	17	106	45	34	75
W2S 107-AA15-88*	Sleeve	115	50/60	17	106	45	34	60
W2S 107-AA01-39	Sleeve	230	50/60	17	106	45	34	60
W2S 107-AA01-13	Ball	230	50/60	17	106	45	34	75
W2S 107-AA01-67	Sleeve	115/230	50/60	17	106	45	34	60
W2S 107-AB07-39	Sleeve	115	50/60	14	71 55	34	23	60
W2S 107-AB07-13	Ball	115	50/60	14	71 55	34	23	75
W2S 107-AB05-39	Sleeve	230	50/60	14	71 55	34	23	60
W2S 107-AB05-13	Ball	230	50/60	14	71 55	34	23	75
W2S 107-AB05-67	Sleeve	115/230	50/60	14	71 55	34	23	60
W2S 107-AB11-39	Sleeve	115	50/60	8	48	23	15	60
W2S 107-AB11-13	Ball	115	50/60	8	48	23	15	75
W2S 107-AB13-67	Sleeve	115/230	50/60	8	48	23	15	60
W2S 107-AB13-39	Sleeve	230	50/60	8	48	23	15	60
W2S 107-AB13-13	Ball	230	50/60	8	48	23	15	75
A2S 107-BA15-02**	Sleeve	115	50/60	17	106	45	34	60
A2S 107-BB07-02**	Sleeve	115	50/60	14	71	34	23	60

*Hall effect monitor **Skeleton fans without housing

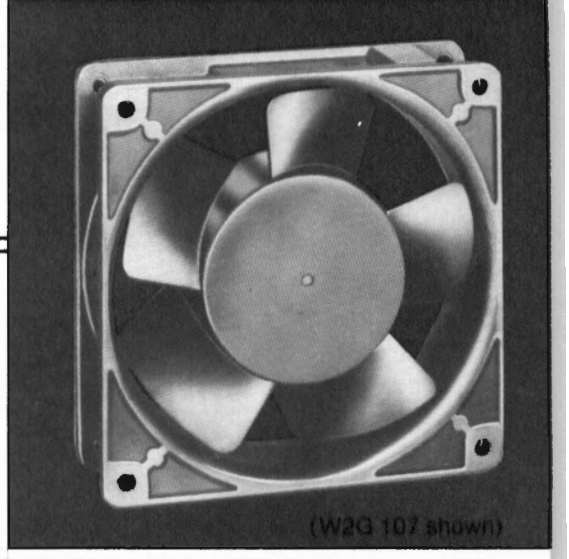
[1]@ 60 Hz; 0 static pressure

W2S107-AA21-39 Sleeve 115 50/60 14 71 34 23 60

DC Tubeaxial Fans

W2G 075
3⅛" x 1½" (80mm x 38mm)

W2G 107
4 11/16" x 1½" (119mm x 38mm)



DESCRIPTION

Features

- Brushless DC external rotor motor is polarity protected against reverse input
- 12, 24 or 48V operation • Reduced RFI & EMI
- Reduced power consumption • Adjustable speed
- All solid state circuitry • Eliminates need for external voltage inverter

Construction/Finish

All-metal construction provides good heat dissipation, long life. Die-cast aluminum housing; sheet steel impeller blades are welded directly to the rotor hub. Surfaces are electrostatically varnished in black.

Mounting

Mount from either face using four .169" (4.3mm) holes—W2G 075 .177" (4.5mm) holes—W2G 107 with four #8 screws and nuts. Ground connections are located on the housing.

Connection

Two flying leads 12" (290mm) long—W2G 075
Two flying leads 10.5" (270mm) long—W2G 107
Terminals Available for W2G 107

Weight

1.1 lbs. (.5kg)—W2G 075
1.4 lbs. (.62 kg)—W2G 107

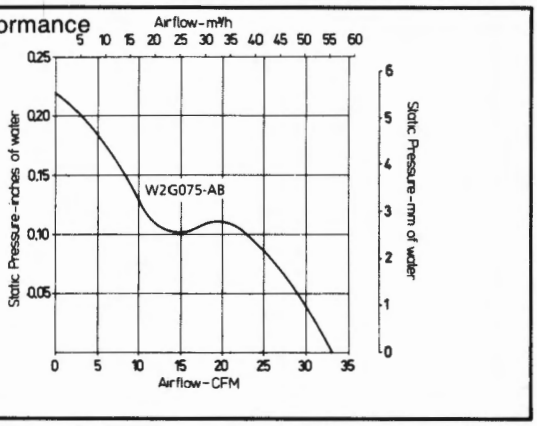
Life

Rated 20,000 to 40,000 hours under typical operating conditions. Actual life varies according to ambient temperature, duty cycle, mounting position and environment.

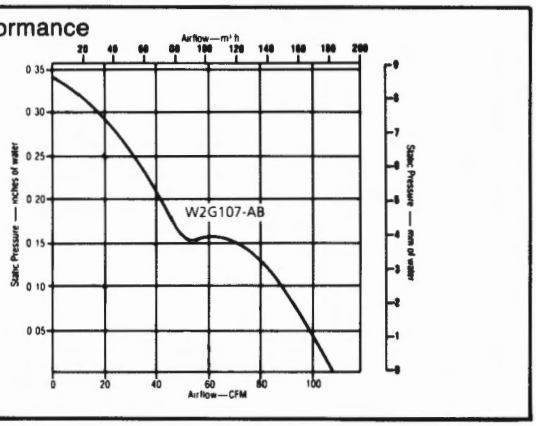
Dimensions

Refer to page 3 dimensions for W2G 075
Refer to page 6 dimensions for W2G 107

Air Performance



Air Performance



Accessories

W2G 075:
Finger guard
9480-2-4039

W2G 107:
Finger guard
9497-2-4039

Shock/vibration mount
2678-2-2945

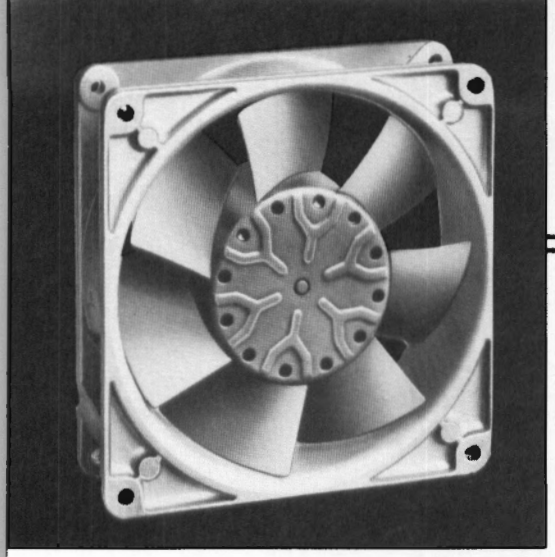
Grill guard
10016-1-5170

Grill guard, filter
10017-1-5170

Grill guard, filter and spacer
10018-1-5170

Type	Bearing	DC Volts	Watts[1]	CFM[1]	db(A)[1]	db(SIL)[1]	Max. Temp. °C
W2G 107-AB02-03	Sleeve	12	4.7	106	45	34	55
W2G 107-AB02-01	Ball	12	4.7	106	45	34	55
W2G 107-AB04-03	Sleeve	24	4.7	106	45	34	55
W2G 107-AB04-01	Ball	24	4.7	106	45	34	55
W2G 107-AB06-03	Sleeve	48	4.7	106	45	34	55
W2G 107-AB06-01	Ball	48	4.7	106	45	34	55
W2G 075-AB22-02	Sleeve	12	3.6	34	42	32	55
W2G 075-AB22-01	Ball	12	3.6	34	42	32	55
W2G 075-AB24-02	Sleeve	24	3.6	34	42	32	55
W2G 075-AB24-01	Ball	24	3.6	34	42	32	55
W2G 075-AB26-02	Sleeve	48	3.6	34	42	32	55
W2G 075-AB26-01	Ball	48	3.6	34	42	32	55

[1] 0 static pressure

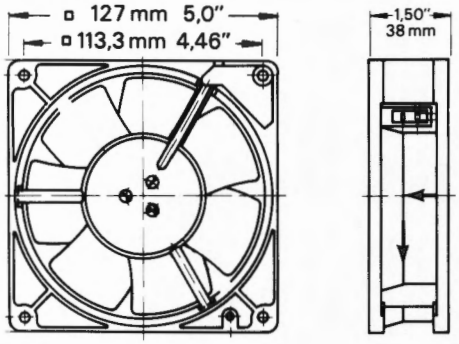


Tubeaxial Fans

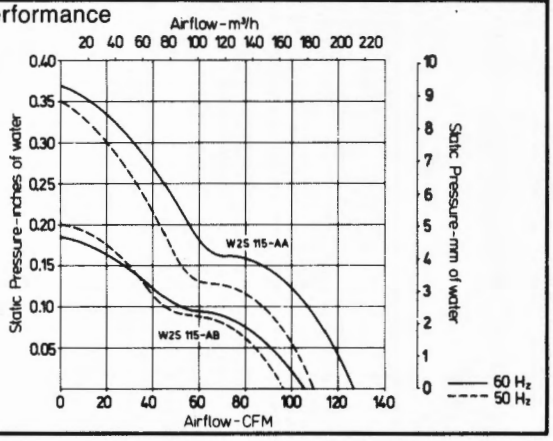
W2S 115

5" x 1½" (127mm x 38mm)

Dimensions



Air Performance



DESCRIPTION

Motor
Shaded-pole external rotor motor with Class "B" insulation system. Maintenance-free sleeve or ball-bearings.

Construction/Finish
All-metal construction provides good heat dissipation, long life. Die-cast aluminum housing; sheet steel impeller blades are welded directly to the rotor hub. Surfaces are electrostatically varnished in black.

Mounting
Mount from either face using four .185" (4.7mm) holes with #8 screws and nuts. Ground connections are located on the housing.

Connection
Two .110" (2.8mm) wide, .020" (.51mm) thick, and .33" (8.5mm) long on .295" (7.5mm) centers. Flying leads are available.

Weight
1.5 lbs. (.70kg)

Safety Codes
All fans are designed to meet UL, CSA and VDE standards. Approved products are listed in:
UL Yellow Card E54522; CSA File LR43145 and VDE 11585.

Life
Rated 20,000 to 40,000 hours under typical operating conditions. Actual life varies according to ambient temperature, duty cycle, mounting position and environment.

Accessories
Plug and cord set
1434-4-6711
Finger guard
9496-2-4039

Options
Dual voltage 115/230V motors
Hall effect monitor
DC Motor

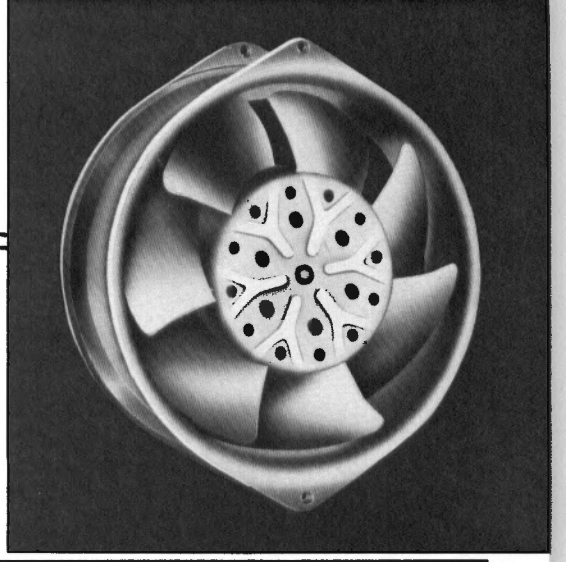
Type	Bearing	Volts	Hz	Watts[1]	CFM[1]	db(A)[1]	db(SiL)[1]	Max. Temp. °C
W2S 115-AA03-39	Sleeve	115	50/60	21	127	46	34	60
W2S 115-AA03-13	Ball	115	50/60	21	127	46	34	75
W2S 115-AA01-39	Sleeve	230	50/60	21	127	46	34	60
W2S 115-AA01-13	Ball	230	50/60	21	127	46	34	75
W2S 115-AB11-39	Sleeve	115	50/60	18	106	40	30	60
W2S 115-AB11-13	Ball	115	50/60	18	106	40	30	75
W2S 115-AB07-39	Sleeve	230	50/60	18	106	40	30	60
W2S 115-AB07-13	Ball	230	50/60	18	106	40	30	75

[1] @ 60 Hz; 0 static pressure

Tubeaxial Fans

W2S 130

6" x 2" (150mm x 55mm)



DESCRIPTION

Motor
Shaded-pole external rotor motor with Class "B" insulation system. Maintenance-free ball-bearings.

Construction/Finish
All-metal construction provides good heat dissipation, long life. Die-cast aluminum housing; sheet steel impeller blades are welded directly to the rotor hub. Surfaces are electrostatically varnished in black.

Mounting
Mount from either face using four .169" (4.3mm) holes with #8 screws and nuts. Ground connections are located on the housing.

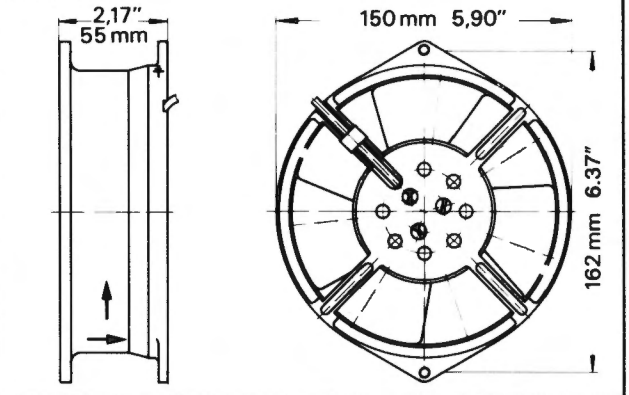
Connection
Two flying leads 13" (330mm) long.

Weight
2.7 lbs. (1.2kg)

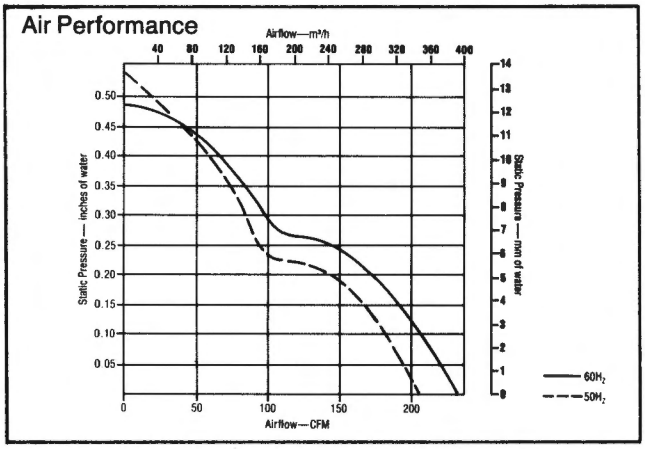
Safety Codes
All fans are designed to meet UL, CSA and VDE standards. Approved products are listed in:
UL Yellow Card E54522; CSA file LR43145 and VDE 836.

Life
Rated 20,000 to 40,000 hours under typical operating conditions. Actual life varies according to ambient temperature, duty cycle, mounting position and environment.

Dimensions



Air Performance



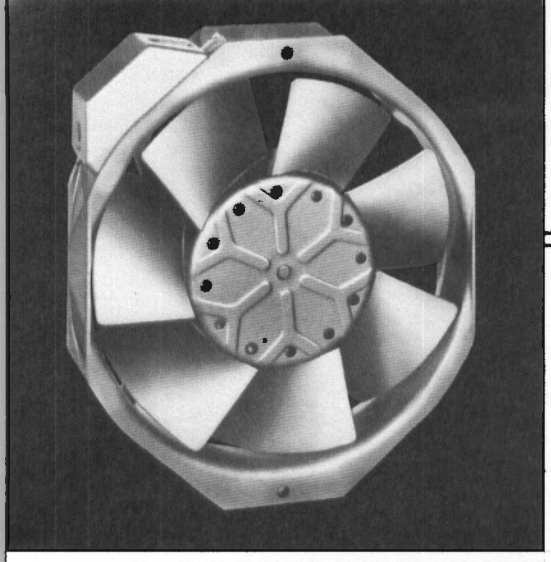
Accessories
Finger guard
9498-2-4039

Options
Dual voltage
115/230V motors
Hall effect monitor
DC motor

Specifications

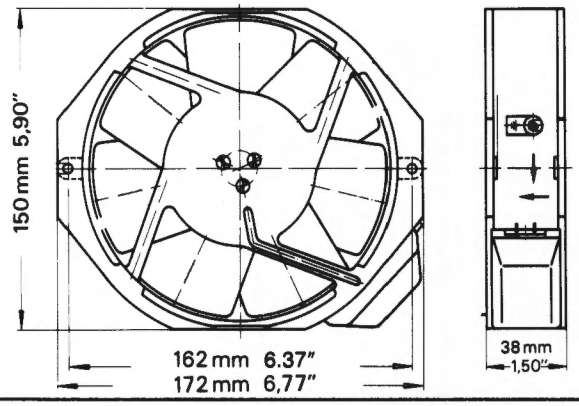
Type	Bearing	Volts	H_z	Watts[1]	CFM[1]	db(A)[1]	db(SIL)[1]	Max. Oper. Temp. °C
W2S 130-AA25-01	Ball	115	50/60	42	233	52	41	75
W2S 130-AA03-01	Ball	230	50/60	42	233	52	41	75

[1]@ 60H_z; 0 static pressure

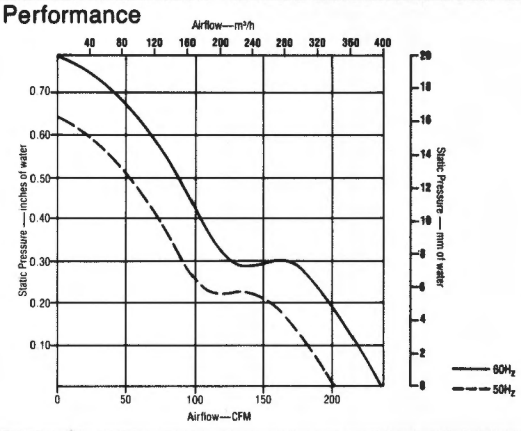


W2E 142
6" x 1½" (150mm x 38mm)

Dimensions



Air Performance



DESCRIPTION

Motor
PSC external rotor motor with Class "B" insulation system. Maintenance-free ball-bearings.

Construction/Finish
All-metal construction provides good heat dissipation, long life. Die-cast aluminum housing; sheet steel impeller blades are welded directly to the rotor hub. Surfaces are electrostatically varnished in black.

Mounting
Mount from either face using two .169" (4.3mm) holes with #8 screws and nuts. Ground connections are located on the housing.

Connection
Two .110" (2.8mm) wide, .020" (.5mm) thick, and .30" (7.5mm) long on .295" (7.5mm) centers. Flying leads are available.

Weight
2.4 lbs. (1.1kg)

Safety Codes
All fans are designed to meet UL, CSA and VDE standards. Approved products are listed in:
ULYellow Card E54522; CSA File LR43145 and VDE 836.

Life
Rated 20,000 to 40,000 hours under typical operating conditions. Actual life varies according to ambient temperature, duty cycle, mounting position and environment.

Accessories

Finger guard	Plug and cord set
9498-2-4039	1434-4-6711

Specifications

Type	Bearing	Volts	Hz	Watts[1]	CFM[1]	db(A)[1]	db(SIL)[1]	Max. Oper. Temp. °C
W2E 142-BB05-16	Ball	115	50/60	26	236	62	53	75
W2E 142-BB01-16	Ball	230	50/60	26	236	62	53	75

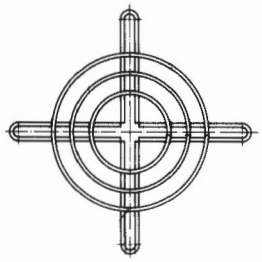
[1]@ 60Hz; 0 static pressure

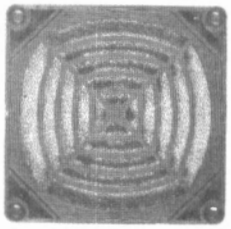
Tubeaxial Fans Accessories

Finger Guards—bright chrome finish

W2S 075
9480-2-4039

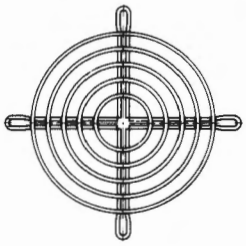
10020-1-5170 Plastic filter

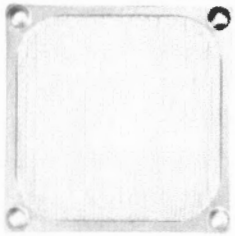




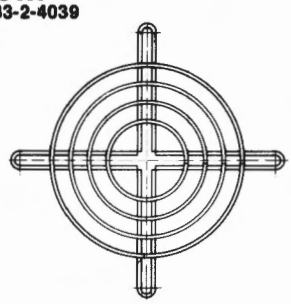
W2S 107
W2G 107
9497-2-4039

10019-1-5170 Screen filter
(**10021-1-5170** Plastic Filter)



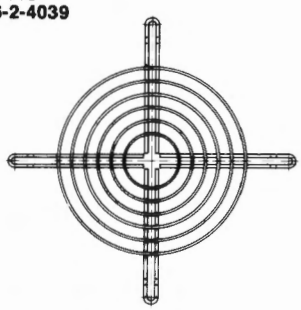


W2S 086
9483-2-4039



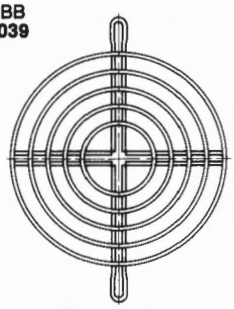
(**10023-1-5170** Plastic Filter)

W2S 115
9496-2-4039



(**10024-1-5170** Plastic Filter)

W2S 130
W2E 142 BB
9498-2-4039

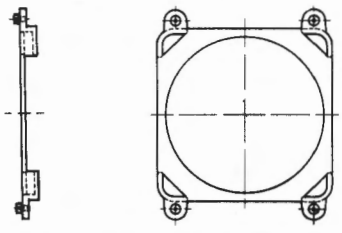


Plug and Cord Sets—24″ for W2S 107, W2S 115, W2E 142

1434-4-6711	Straight—24″ (shown)
1434-4-6711-1	Right angle—24″
1434-4-6711-3	Right angle—36″

Shock/Vibration Mount for W2S 107, W2G 107

2678-2-2945



Filter Frame for W2S 107, W2G 107

10016-1-5170	Black plastic grill guard
10017-1-5170	Grill guard, filter
10018-1-5170	Grill guard, filter and spacer frame